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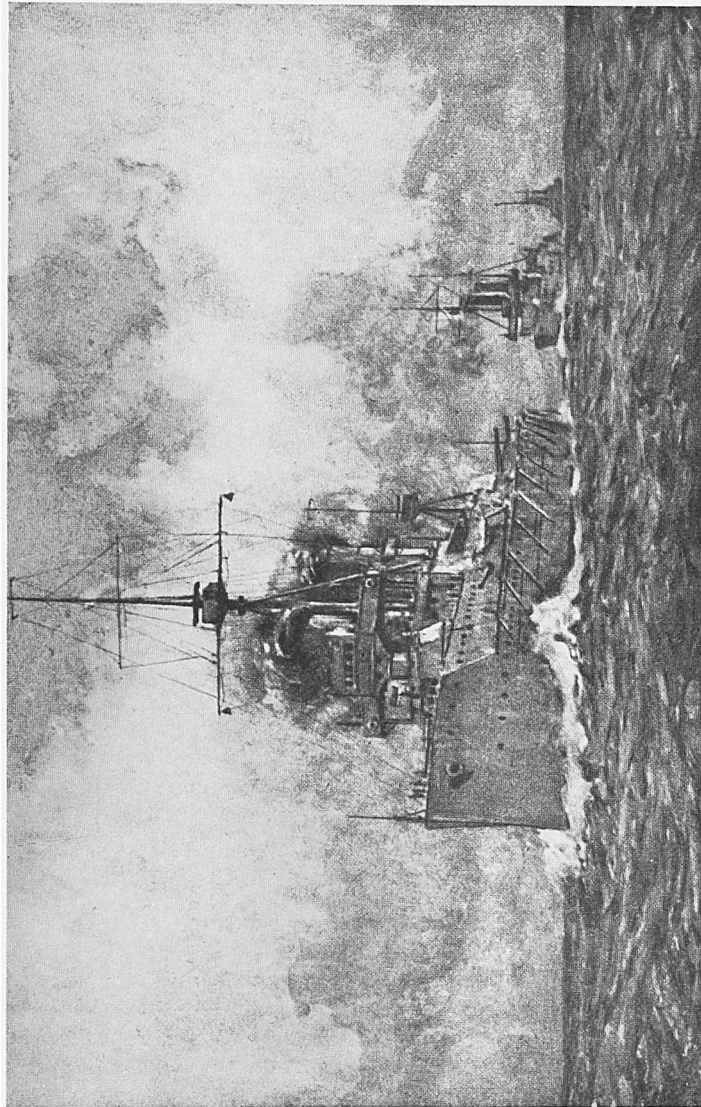
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H. M. S. Dreadnought

EVOLUTION OF THE WARSHIP

THE latest thing in superdreadnoughts is neither English, nor German, nor French; and although it is the product of a shipyard in this country, it is not for the United States of America. In fact this superb fighting craft is for one of the A B C nations—one of the South American republics. It is the Rivadavia which the Fore River Ship Building Company has turned out for Argentina.

A hundred years ago the old line-of-battle ship was of wood, had many decks and was pierced for more than one hundred guns. Such was the big fighting machine. Today the superdreadnought of steel has ten or twelve guns. But these are of from thirteen to fifteen inch calibre. A single shot from one of them weighs almost as much as the total of metal discharged from all the guns on the ship of one hundred years ago. Such difference, and more, is there between the first ships of the line that are separated by a century. One shell from a superdreadnought would set one of the old line-of-battleships ablaze from stem to stern.

The superdreadnought has developed in the course of a thousand years from the open rowboat that carried armed men. This may be said to have been the type of war boat Alfred the Great found in use and from which he began to develop a fleet of war vessels. Alfred himself took command of his fleet in sea battle and was quick to found, organise and systematically plan

the extension of his country's "sea power," though he had never read Mahan and even was ignorant of the term of which that author practically was the inventor. Evidently Alfred had grasped the fundamental fact that the rampart of defence to an island race lay on the sea that lapped their shores, and that their only adequate protection lay in an efficient navy.

Alfred succeeded his brother Ethelred in 871, but it was not until he had by his victories over the Danes secured at any rate temporary peace for the territory over which he held sway, that he devoted his attention to providing permanent security from foreign attack in the shape of a fleet. One of the chief marks of Alfred's genius lies in the fact that he was his own naval architect. As Campbell says of him, "he had made himself master of the principles of ship-building, and knew how to vary the form in constructing vessels, so as to fit them for different uses and services; which, if the ignorance of those times were half so gross as modern writers are willing to represent, was certainly a very great and wonderful discovery. . . . His naval architects might be, and in all probability were, men of as great skill and extensive capacities as any of their time; but then their knowledge was of a very different nature from that of the king: they might be great artists in their way, but were still mechanics."

The type of craft that conveyed the Saxon raiders oversea were simply un-

decked rowboats, somewhat high at prow and stern, and fitted with a pole mast carrying a single square sail. They could accommodate some fifty or sixty men, and were specially built for beaching. The ships of the Danes were of the same type, but developed into somewhat more sea-going and habitable vessels, and the larger ones were fitted with light removable half-decks. A typical craft of this kind, found in Jutland, is seventy-five feet long, with a beam of ten and a half feet, and was apparently intended to be propelled by twenty-eight

of the craft that he had seen in the port of the Tiber aided him when he came to work out the designs of what were known as the "king's ships"—built primarily for war, though hired out for trading purposes in time of peace—and which may fairly claim to be the earliest vessels in a "Royal Navy." In the very year that the earliest "king's ships" were launched, they swept the South Saxon coast clear of pirates, destroying no less than twenty of these hornet craft, and putting their crews to the sword; and in 885 his fleet inflicted a signal de-



Ship at the Time of Alfred The Great

oarsmen. Alfred's vessels were akin in type, but vastly superior in design and sea-worthiness to the latter, as is evident from the description of contemporaries: "Full nigh twice as long as the others; some had sixty oars, some had more; they were both swifter and steadier and also higher than the others; shapen neither like the Frisian nor the Danish, but so as it seemed to him that they would be most efficient."

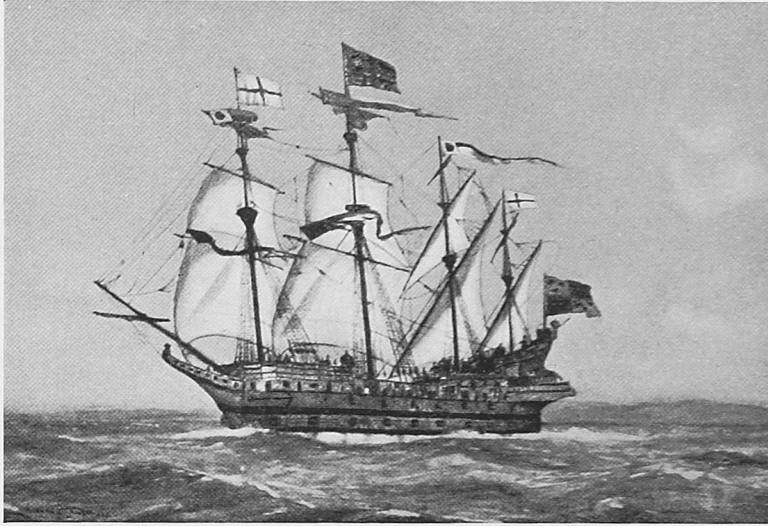
Campbell seems to think that they were of a type akin to the "galleys" of the Mediterranean; and as Alfred had twice visited Rome, though only as quite a child, it may be that dim recollections

feat on the Danish invaders off the Essex coast. Alfred, however, was not invariably successful in the long-protracted naval warfare; but experience was being gained, the importance of sea power becoming more and more recognised, and a love of maritime enterprise was being engendered in the characteristics of the race. So much, indeed, was the latter the case, that Alfred sent out several expeditions for the purposes of discovery and commerce. Other, a native of Heliogland, at the present time, as we know, the great outlying bulwark of Germany's naval base, searched, "by the King's

procurement," for a northeast passage.

In its gradual evolution from the row-boat to the ship with sails and through increase in size and sail power the war-

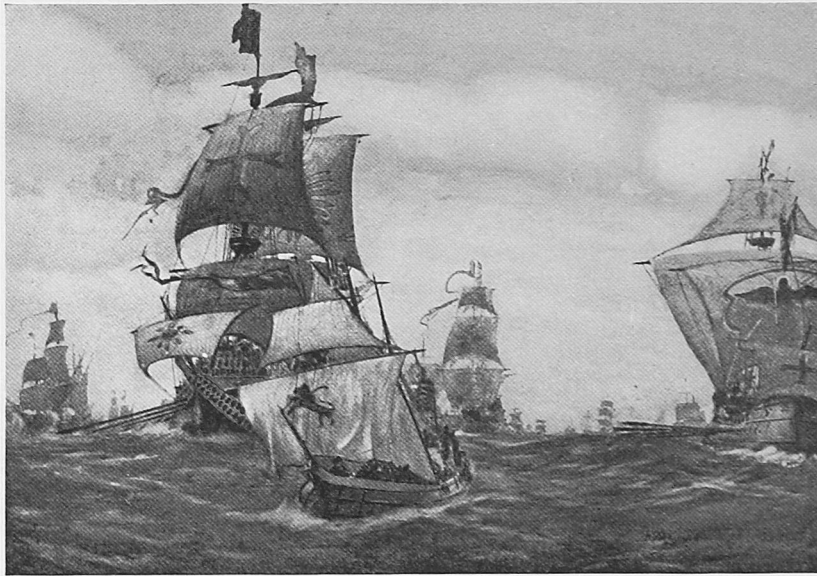
though she probably engaged in commerce during peace time. This ship is stated by Derrick to have been burnt by accident at Woolwich in 1553; but



The Henry Grace de Dieu, 1515

ship attained the dimensions of the Great Harry, built by Henry VII in 1488, at a cost of £14,000. This may be regarded as the first ship of a royal navy,

according to Yonge she was, on the accession of Henry VIII, rechristened Regent, and perished in a memorable battle.



The Spanish Armada in the Bay of Biscay, 1588

for, unlike previous "king's ships," which in no way differed from ordinary merchantmen of their period, she was undoubtedly built primarily for war,

This action took place off the harbour of Brest and was against the French ship Cordelier, one of the masterpieces of Descharges, the inventor of portholes,

and the finest ship in the French Navy. In the sanguinary duel that ensued, one of the two vessels caught fire, the conflagration spread to its opponent, and the result was the annihilation of both ships with all on board. The French to this day relate, and probably with truth, that the captain of the *Cordelier*, seeing English aid coming to the Regent, and the capture of his own ship probable, purposely set her on fire to ensure the destruction of both. Be this so, or not, the fact remains that the name of her captain, Hervé de Portsmoguez, metamorphosed into "Primauguet," has been for centuries immortalised by a ship of that name appearing on the French naval lists. To replace the Regent, Henry VIII built his great ship, the *Henry Grace de Dieu*. A great novelty in this ship was that she had portholes, thus giving extra battery decks. This was a design introduced into the French ships fifteen years before by Descharges, a Brest shipwright. Henry's great ship was a two-decker, of large tonnage—one list says fifteen hundred—carrying twenty-six heavy guns, fourteen on the lower and twelve on the main deck. Of the light pieces there were forty-six—eighteen on the poop and quarter-deck, and the same number on the forecastle, and ten giving fire direct astern. She had four masts and a bowsprit, and was square-rigged on the "foer" and "mayne," and lateen-rigged on the "mayne mizzen" and "bonaventure." She may be taken as a typical "great ship" of the sixteenth century; for the improvements that took place during the Elizabethan era consisted not so much in enlarging tonnage, but in building on longer keels and with finer lines, in

the lowering of the great top-heavy superstructures, and, finally, in the sheathing of the keels with lead (an idea taken from the Spaniards), so as to decrease fouling.

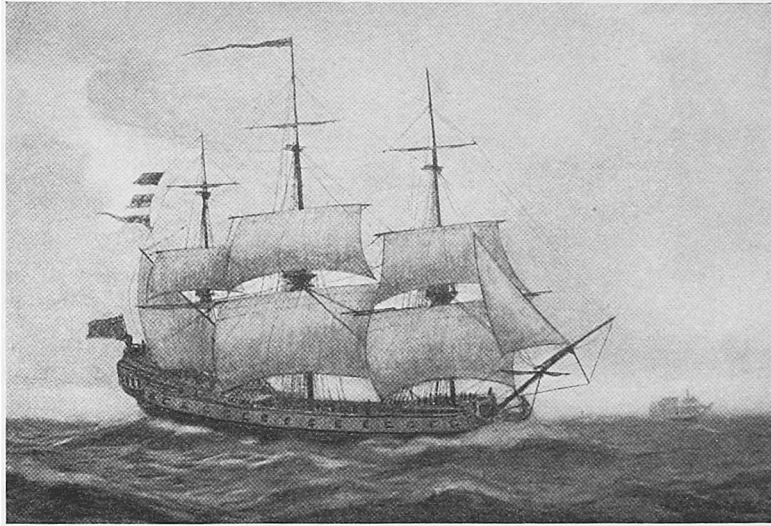
Ordnance, and that of fairly large calibre, was now universally carried. The heavy pieces comprised cannon, demi-cannon, and cannon-petro, mounted on the lower deck, and culverins and demi-culverins mounted on the main deck. On the superstructure were carried the medium pieces, sakers, minions, falcons, falconets, and rabinets. Smaller pieces, known as "port-piece halls," "port-piece chambers," "fowler halls," "fowler-chambers," and "curtalls," were also carried. Many of these latter discharged a number of projectiles—the prototype, in fact, of the modern "grape" and "canister"—and were mounted pointing inboard from the poop and forecastle, so as to be utilisable against any boarders who had made good their entrance.

In fact, during the period so far did the science of artillery advance that we are told "sea fights in these days come seldom to boarding or to the great execution of bows and arrows, small shot, and the sword, but are chiefly performed by the great artillery breaking down masks and yards, tearing, raking, and bilging the ships." Some of the guns were brass pieces; indeed, according to Derrick, all the ordnance in some ships was of that material, but in the main the guns were constructed of iron. The fact that the smaller pieces of artillery were "breech-loading" is but another proof of the old adage, that there is nothing new under the sun.

According to H. L. Swinburne's

“Royal Navy,” the “Invincible Armada,” which in May, 1588, sailed from Lisbon, had a strength in round numbers of one hundred and twenty ves-

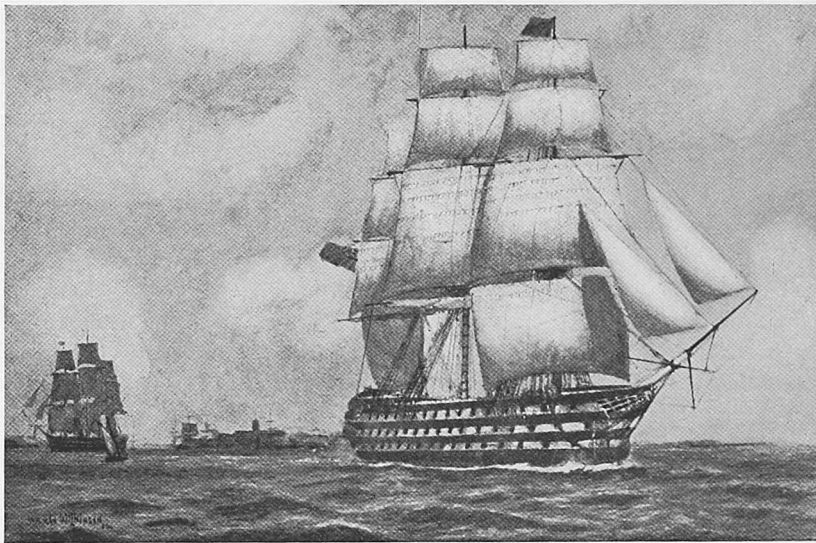
siards, but there was presumably no question as to the fighting superiority of the Armada on paper. Ship for ship the Spanish fleet looked to be double



An Early Type of Frigate, 1750

sels, registering about fifty-eight thousand tons, carrying nearly two thousand five hundred guns of all calibres, and with a personnel that numbered

the size, for the tonnage of the British fleet was but half that of the Armada. There was even a greater numerical disparity between the personnel of the



Battleship, 1839

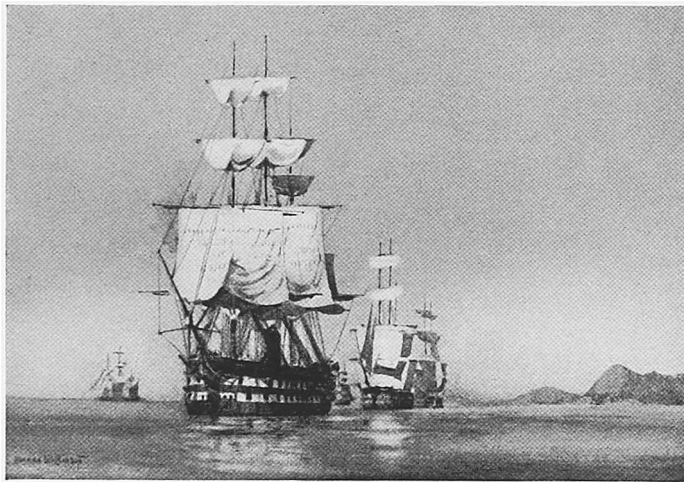
over nineteen thousand soldiers and eight thousand seamen. The numerical superiority of the English aggregation was in excess of that of the Span-

two fleets, the superiority again lying with Spain. Finally, the Spanish ships were supposed to carry much heavier and much more numerous ordnance.

This fighting superiority was, however, to a great extent more apparent than real. The Spanish method of measuring tonnage gave results from twenty-five per cent. to forty-five per cent. higher than the system then in vogue in England. The great superiority in men was counterbalanced by the fact that, throughout the Spanish fleet, the proportion of seamen to soldiers was, in the bulk of the ships, ridiculously inadequate. Most of them were in fact but transports, though the Spanish infantry they carried was at the period

to check it—is what England faces in the present war.

One of the illustrations to this article is a frigate of 1750. After the death of George I, in 1727, the British fleet—taking this as a type—expanded, though not by an increase of first and second rates, but of the third, fifth, and sixth rates. In 1714 it had one hundred and thirty-one ships of the line, of fifty guns and upwards; in 1727, one hundred and twenty-four; in 1752, one hundred and thirty-two; and in 1760, one hundred and fifty-five. But the real increase was



Auxiliary Steam Battleships

reckoned the finest in the world. Much of the Spanish ordnance existed only on paper; for many of the ships were but halfarmed, or their armament completed with pieces either too light to be effective except at very short range, or so antiquated as to be nigh useless. The destruction of this fleet forms an admirable instance of the value of control of the sea. For in the Netherlands were waiting thirty thousand picked troops of Spain, for whom the Armada, by crushing the British fleet, was to afford safe transport for the invasion of England. Precisely the same problem—a threatened invasion and how

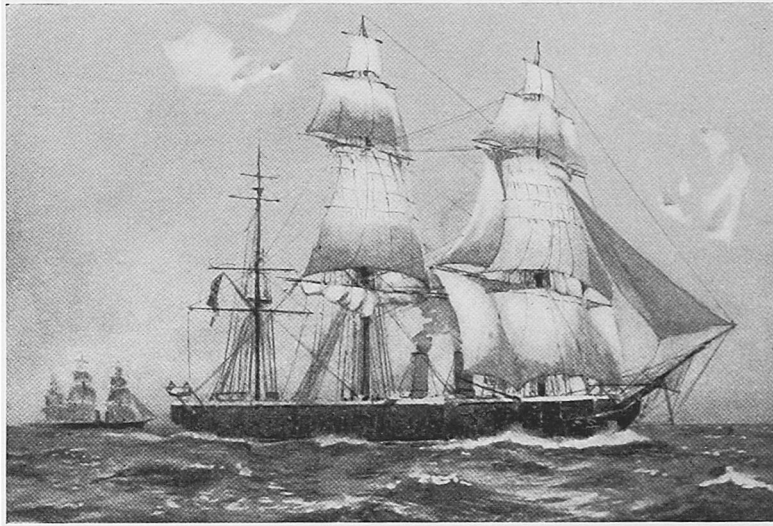
in the third and fourth rates. In may be noted, however, that after 1756 the fifty-gun ships were not ordinarily counted as of the line of battle. The ships were larger, built upon better lines, and were greatly increased in sea-keeping qualities. It was during the period of the Seven Years' War, the frigate class was introduced; and, demonstrating its value, was built in increasing numbers later on. Frigates mounting twenty-eight guns began to be built about 1748, but they had no larger gun than the nine-pounder. Twelve-pounder thirty-two gun frigates also came into the fleet, and grow-

ing experience added to their value.

To the naval historian the first Burmese war is one of intense interest, for it was in that war that for the first time

were their present enemies, Prussia and Austria.

The Sultan of Turkey and his vassal, the Pasha of Egypt, had for some years

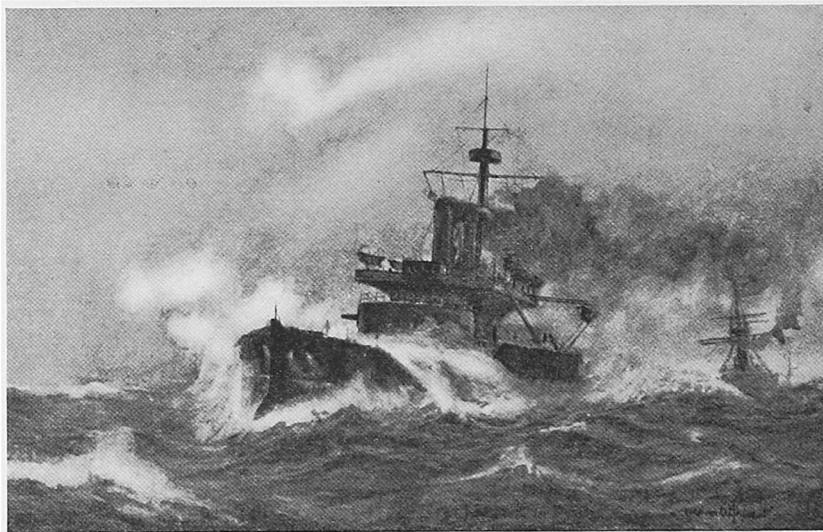


The First British Seagoing Ironclad, 1863

a steam-propelled vessel was used as a ship of war. This was the Diana, a small steam-paddle vessel.

In 1840 there was what, in the light

been engaged in a more or less intermittent series of hostilities; and, in 1840, the four countries named came to the aid of Turkey, and concluded



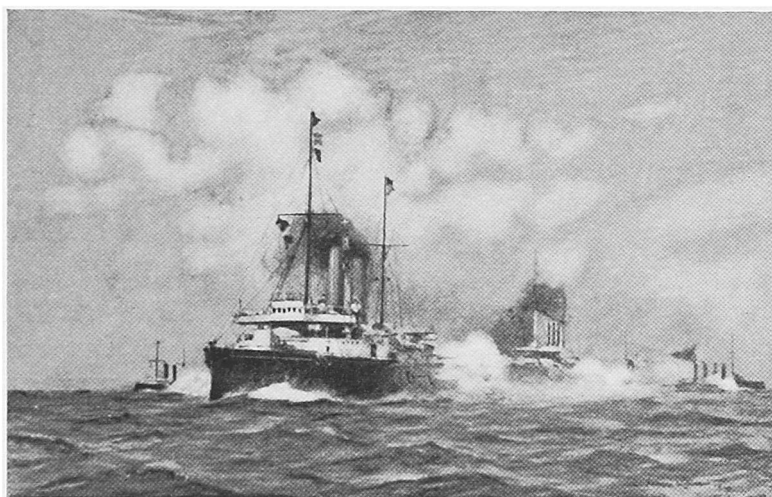
An Early Type of Seagoing Turret Ship, 1877

of present events in Europe, appears a curious alliance between four European countries. Two of these, it is true, were England and Russia; but with them

with that power a treaty agreeing to compel Mahamed Ali, the Pasha of Egypt, to accept the terms that his Turkish suzerain had offered him.

Mahamed Ali refusing compliance with the terms of the allies, operations on the Syrian coast were commenced by the Mediterranean fleet, then under the command of Admiral Sir R. Stopford. The most important of these engagements was the attack on Acre, a fortress which the Egyptians deemed to be impregnable, as it had taken Ibrahim Pasha (son of Mahamed Ali and Egyptian commander-in-chief), with forty thousand men at his disposal, not less than ten months to subdue it, when

cult of attack, for not only were the batteries mounted with two hundred guns and manned by upwards of five thousand men, but the navigation of the approaches was difficult, and all the channels had to be sounded and buoyed, a task superbly performed by the masters of the fleet. On the 3rd of November the attack was made, and, although the signal to weigh had been made at 9.30 in the morning, owing to the lightness of the breeze, it was nearly two o'clock before the ships were



A Cruiser, 1901

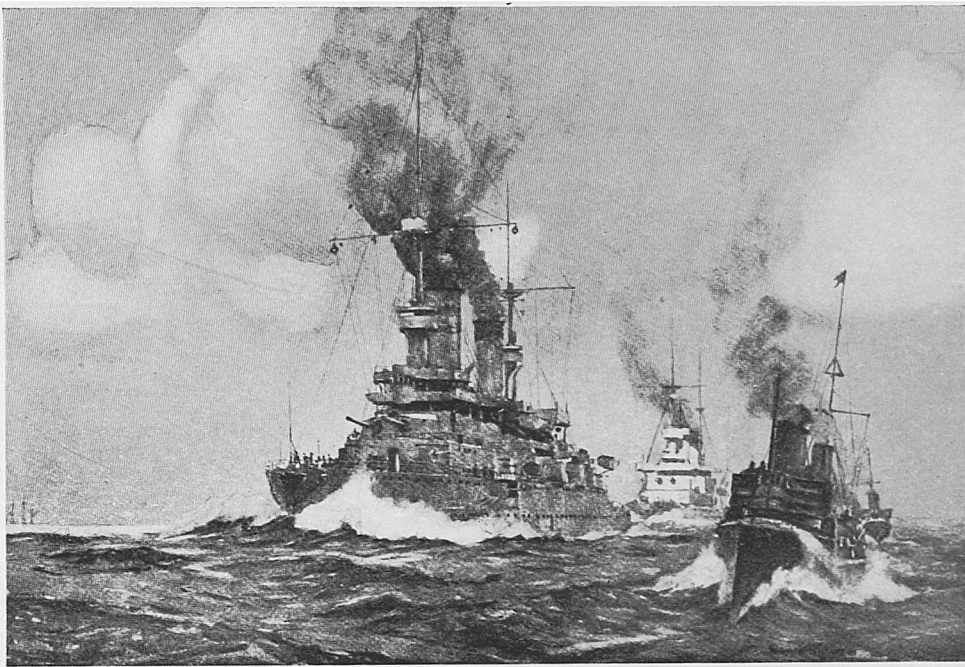
Syria had been seized from Turkey some few years before. The fleet under Sir R. Stopford comprised seven line-of-battle ships, four frigates, four steamers, and two sloops of the Royal Navy. There was also a Turkish seventy-four gun ship, flying the flag of Admiral Walker Bey, the Turkish commander-in-chief, and two frigates and a sloop of the Austrian Navy. The point of interest in the affair, as regards the evolution of the warship, is that even then steam and sail were being employed conjointly, steam not having yet superseded canvas.

The place was one immensely diffi-

in a position to commence the bombardment. In consequence of some error in the disposition of the main fleet, those ships which were to the northward of the flagship, and formed part of the division of five battleships and one frigate that attacked the western face of the fortifications, found themselves at too great a distance from the forts to be really effective. The brunt of the attack fell on Commodore Napier's division, which comprised two battleships, four frigates, and the smaller and foreign craft, and it engaged in the attack on the south and east of the spit of land on which the

fortress of Acre stands. It was the four paddle steam sloops that took up action midway between the main fleet and that of Commodore Napier, but further out to sea. For two hours the bombardment raged with fury, until at four o'clock the principal magazine of the enemy burst with an appalling explosion, demolishing a large portion of the town and fortifications in its neighbourhood, as well as the bulk of two

the town, and shortly afterwards the men of the fleet took possession of it in the name of the Sultan. What the exact losses of the enemy amounted to is uncertain, but they must have been enormously heavy, for the loss caused by the explosion of the magazine alone—caused by one of the steam vessels—is variously computed at from one thousand two hundred to two thousand lives. The loss of the allies was trifling.



German Battleships and Destroyers

regiments of infantry that were in its vicinity, standing to arms in readiness to repel any attempt at storming. It is believed that this effect was achieved by the explosion of a shell fired from one of the steam vessels. The result absolutely disheartened the enemy; but whilst their fire slackened, that of the ships continued with unabated energy, and by sunset scarcely two score of the guns in the enemy's powerful batteries remained serviceable. At day-break some deserters came off with the news that the garrison was evacuating

In all, the British lost but twelve killed and thirty-two wounded, and the Austrians two killed and six wounded, and the Turkish flagship four killed and three wounded. The Egyptians evidently fired high, for, though most of the ships were more or less hulled, yet, in the majority of cases, it was the masts and rigging that most suffered.

Evolution is a slow process. But let a type once approach perfection and the process becomes rapid. Centuries intervene between the rowboat and even between the sailship and the steam pro-

pelled war vessel; while the changes that took place, roughly speaking, within the past fifty years, may be conveniently grouped as follows:

As regards propulsion—

- (a) The total supersession of sails by steam power.

As regards construction.

- (b) Wood as a material superseded by first iron and then steel.
- (c) Protection by armour introduced.

As regards ordnance—

- (d) The rifling of guns.
- (e) The adoption of breech-loading ordnance.
- (f) The adoption of the torpedo.
- (g) The submarine torpedo craft.

Even to outline the progress of each of the above seven changes will show the extent of alteration navies have undergone in a period that may be put roughly at half a century. To begin with the supersession of sails by steam, it is true that this transformation commenced earlier than the period stated, but the most important phases of the development took place within that period. We have seen how, as far back as the Burmese War of 1824-26, a steam propelled vessel was used as a ship of war, but it was not until the screw propeller replaced the paddle that sails finally gave way to steam. It is easy to understand how paddle steamers were not much in favour, for, on account of the interference with the broadside fire of a ship, paddle propulsion practically limited a ship's armament to bow and stern guns.

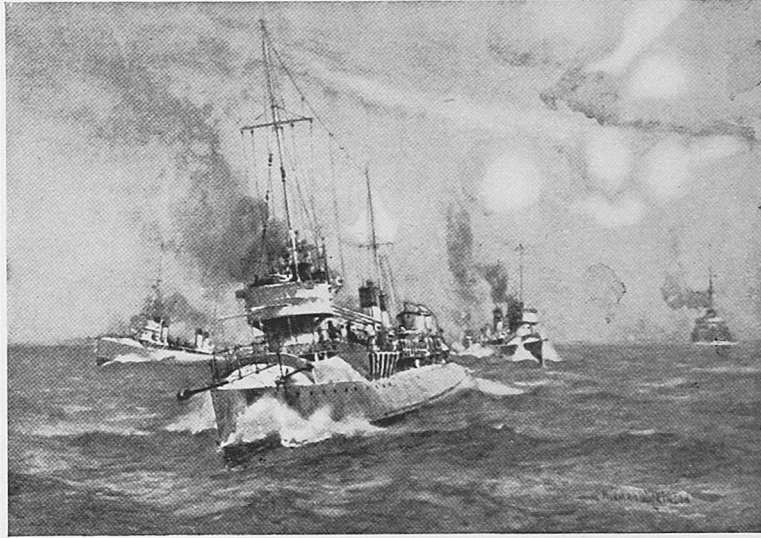
The screw was first experimentally tried, as far as the navy is concerned, in 1842; and when the *Erebus* and *Terror*,

that composed Sir John Franklin's expedition to the Arctic in 1845, left England, each ship was fitted with a screw. By the time of the Crimean War the screw for large ships was firmly established, though even then many line-of-battle ships were sailing vessels, and it was not until 1859 that it was officially declared that "sailing ships are unfit for active service." Masts and sails, however, were still regarded as absolutely essential to all seagoing ships, and this remained so until sail power disappeared entirely in the turret ships of the "70's." For broad-side ships, however, sail power still continued for some years. As late as 1893 a central-battery battleship in a fleet that was concentrated for manœuvres, asked permission to spread sail to enable her to keep station, as her steaming power was not equal to the speed the admiral in command had ordered. She was probably the sole battleship with masts and spars. All the others had had their sailing masts removed and pole masts with fighting tops fitted. Twin screws, now universal, were first proposed in 1860, and first fitted in the *Penelope*, one of the smallest of the ironclads that was completed for England in 1868. Today turbine-driven engines have completely replaced the older type, and have come to stay, for practically every ship of war now constructing, from torpedo boat to battleship, is turbine-driven. Coupled with this new departure there is also another, in that most recent ships are fitted for the consumption of oil fuel as well as coal.

Turning to construction, the two great innovations, the substitution of iron for wood and the introduction of protective plating, may be regarded as

having occurred almost simultaneously. As far back as 1812, iron canal boats had been built, and later the same material was employed in the construction

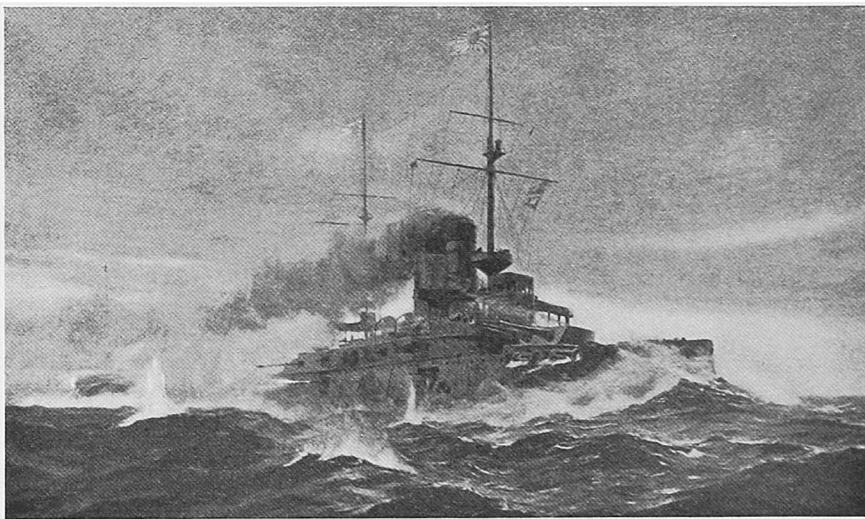
under the effect of shot, which went to show that iron vessels were not suitable for warships, she and one or two other iron vessels that had been built,



French Destroyers

of steamers for mercantile marine; but, necessarily, again going to England for naval type, it was not till 1845 that the first iron war steamer was built in that country. This was the Birkenhead, whose

or were building for the navy, were turned into troop-ships. It was nearly fifteen years later, in 1859, that the two first iron warships, the Warrior and Black Prince, were laid down as addi-



Japanese Battleship

name is known world-wide on account of the heroic conduct of the troops and seamen that perished with her when she was lost by shipwreck in 1852. Owing to experiments in testing iron

tions to the navy. In the late seventies the change to steel came; the two first vessels so constructed being the sister fast cruisers, Iris and Mercury, laid down at Pembroke, the former in 1877,

the latter in 1878. With the Black Prince and Warrior was also introduced the system of protecting the hull by vertical armour, as far as sea-going ships are concerned, for in the Crimean War, floating batteries protected by iron armour had already been proved in actual warfare. Indeed, as regards ocean-going iron-clads, a fine French two-decker, originally the Napoleon and afterwards re-named La Gloire, had been completed in 1859. She, however, was a wood-built ship, and so England can claim the credit of having put afloat the first sea-going iron armour-clad ship of war. The armour used was wrought-iron, and this held place till 1875, when "compound" plates were first used in the turrets of the Inflexible. In these plates two-thirds of the thickness is of wrought-iron, the outer third being of steel. This gave to the plate the resistance of steel, combined with the toughness of wrought-iron. Steel alone, while it resisted penetration, was brittle, and experiments showed that plates composed entirely of this material would crack and break up. "Compound" armour ruled up to, and including many of, the ships built under the Naval Defence Act of 1889; but since then all-steel plates so chemically treated as to give them all the toughness of wrought-iron, without in any degree detracting from the power of resistance to penetration, have become universal.

With regard to ordnance, or, in other words, the offensive power of warships, the development has been enormous. Practically the guns that Nelson used at Trafalgar were much the same as Drake's; and, though more scientifically constructed, almost similar smooth-bore guns were mounted in the War-

rior and Black Prince. "Smooth-bore" guns became useless immediately armour plating was introduced; and "rifling," which had for some time been used for small arm weapons, was first adapted to big guns by Mr. Lancaster, and guns built on his design were used during the Russian War, both on shore in the Crimea and on gunboats in the Baltic. From the Russian War, for thirty years, all heavy ship guns were rifled muzzle-loaders, the size gradually increasing from the six and one-half ton and nine ton guns, mounted in the earlier armour-clads, till in the Inflexible, completed in 1881, guns of eighty tons were mounted. Breech-loading guns had been introduced, but were found to be complicated and unsatisfactory, until improvements in the manufacture of guns and in explosives, forced the necessity of adopting the breech-loading system. Some years before the permanent adoption of breech-loading ordnance came the introduction of the automobile torpedo, a weapon now established as much a part of naval ordnance as is the gun, and, within its limits, as reliable and as accurate. Both these weapons of aggression have developed side by side until today the main armament of battleships is composed of fourteen inch and even larger guns, whilst the present war has shown the long and deadly range of torpedoes and the utility, under certain conditions, of the submarine.

The evolution of the warship can be gathered from the pictures that accompany this article. These include, besides examples from the British navy, illustrations of German, French and Japanese warships.